

Managing High Blood Cholesterol & Other Lipids



- Understanding Blood Lipids
- Blood Lipids and Cardiovascular Disease Risk
- How Medications Can Help
- Lifestyle Changes to Control Lipids



Why Should I Care About Blood Lipids?

You've been given this booklet because lab tests show a problem with your blood lipid levels. This may not seem like a big deal—but it is.

Lipids are fats and related substances, such as cholesterol. When certain types of lipids in the blood are too high or too low, the result can be heart attack, stroke, and other serious health problems. But unhealthy blood lipid levels (dyslipidemia) can be changed. Now's the time to learn what you can do about your blood lipids, and how to get started.

Cardiovascular Disease

The cardiovascular system is the body's transport network. It's powered by the heart. Blood vessels called **arteries** carry blood to limbs and organs, and **veins** carry it back to the heart. Damage to this system, in particular the arteries, is called cardiovascular disease. It can affect just about any part of the body. But we worry most about the vital organs, such as the heart and brain. If something harms them, you can become very ill or even die.

Key Points About Lipids and Cardiovascular Disease

Certain conditions called **risk factors** increase a person's chance of developing cardiovascular disease.

- Unhealthy lipid levels are a major risk factor for heart attack and stroke. This is true even if you don't currently have symptoms of cardiovascular disease.
- Other risk factors include excess weight, diabetes or pre-diabetes, smoking, and high blood pressure. If any of these applies to you, your risk is higher.
- A family history of early heart disease or stroke increases risk, even if you have no other risk factors.
- Lifestyle changes and medications can reduce the likelihood of heart disease or stroke—if you stick with the program.



Overeating and lack of exercise can lead to unhealthy lipid levels. What you do today is the basis of your health in the future.

This booklet is not intended as a substitute for professional medical care. Only your doctor can diagnose and treat a medical problem.

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Take Action to Control Lipids

Get started today on the road to better cardiovascular health:

- **Step 1:** Learn about the cardiovascular system, the role lipids play, and how abnormal lipid levels cause cardiovascular disease.
- **Step 2:** Use this information to understand how the numbers on your lab report relate to your risks and lifestyle.
- **Step 3:** Take action. Medications can help control lipids. So can lifestyle changes such as losing weight and quitting smoking. Lifestyle changes and medications go hand in hand. You will most likely need both.

This booklet can help you get started.



Blood tests track your blood lipids and let you see how you're doing.

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Understanding Blood Lipids

Lipids in the blood come from two sources. One is food. The other is the body itself, which makes lipids out of raw materials found in its system. Lipids are used for energy and other functions. They travel around the body in the bloodstream, using “vehicles” called **lipoproteins**.

The Lipid Family: Types of Lipids

Lipids can take many forms. Your body needs the right balance of different types of lipids to function normally. Two key lipids are:

 Cholesterol	 Triglycerides
Your liver uses this waxy substance to make bile, which is needed for digestion. Cholesterol is also used to form cell membranes and make hormones. An adult body can make all the cholesterol it needs without taking any from food.	Triglycerides are a special form of fat. The body converts dietary fat and other food energy (calories) into triglycerides. They then travel in the bloodstream to be used for energy or stored as body fat.

Lipoproteins: Transporting Lipids in the Blood

Lipids are fats, and blood is mostly water. Fat and water don't mix. So we need lipoproteins (lipids packaged in a protein shell) to carry the lipids. The protein shell lets lipoproteins enter the bloodstream, carrying their cargo of lipids. There are several types of these vehicles, each with its own cargo and its own job:

		
VLDL	LDL (“bad cholesterol”)	HDL (“good cholesterol”)
VLDL (very-low-density lipoprotein) has a cargo made up mostly of triglycerides. It also carries some cholesterol. VLDLs deliver triglycerides around the body for use or storage.	LDL (low-density lipoprotein) mainly carries cholesterol. It delivers this cholesterol to body cells. LDL cholesterol is often called “bad cholesterol.” That’s because if there’s too much, it can build up in artery walls.	HDL (high-density lipoprotein) consists mostly of a protein shell. This lipoprotein acts as a scavenger. It collects excess cholesterol that LDLs have left behind in artery walls. That’s why HDL cholesterol is called “good cholesterol.”

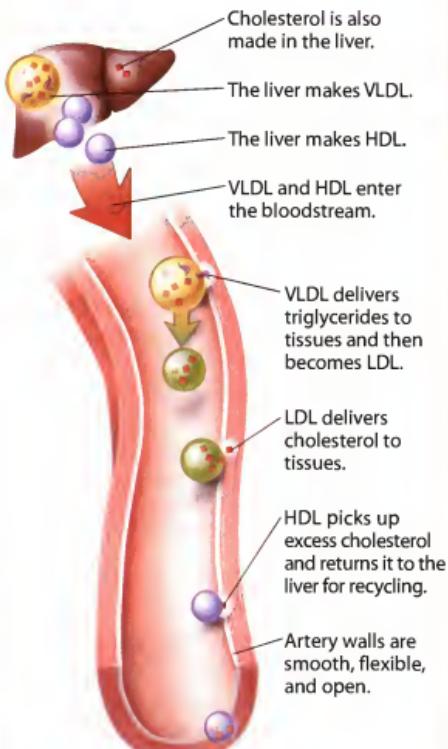
Lipids in Motion

The body takes lipids, such as cholesterol and triglycerides, from food. The lipids then enter the bloodstream. Meanwhile, the liver collects, recycles, and makes lipids and lipoproteins. If this process works well, arteries remain healthy. If not, unhealthy lipid levels can lead to artery damage and cardiovascular disease.

Healthy Lipid Levels

Healthy lipid levels can be partly due to a diet low in calories, fat, and cholesterol. At the same time, the liver has to make the right amount of each type of lipid. When lipid levels are healthy, cholesterol gets where it's needed without building up inside arteries.

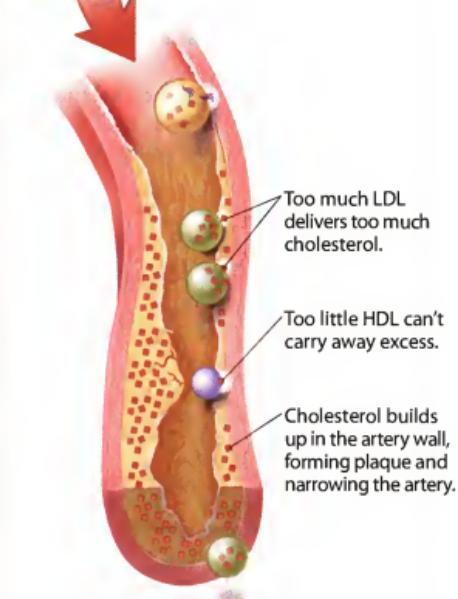
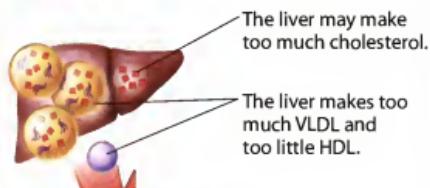
Cholesterol  and triglycerides  come from the diet.



Unhealthy Lipid Levels

Unhealthy lipid levels may be due to poor eating habits. Or the liver may make the wrong amount of certain lipids—a problem that often runs in families. If LDL levels are high and HDL levels are low, excess cholesterol builds up. This damages and clogs the arteries.

 Too much cholesterol and triglycerides come from the diet.

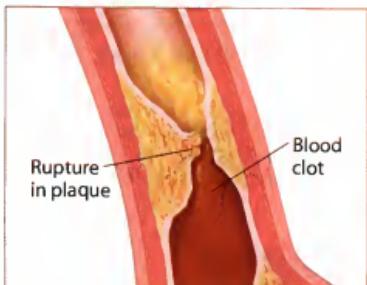


The Whole Body Is Threatened

Unhealthy blood lipid levels cause **plaque** (a fatty material made mainly of cholesterol) to form in artery walls. Over time, this can narrow or block arteries, limiting blood flow. The parts of the body that aren't receiving enough blood can become damaged. Arteries form a network throughout your body. So unhealthy blood lipid levels can result in damage to many parts of the body.

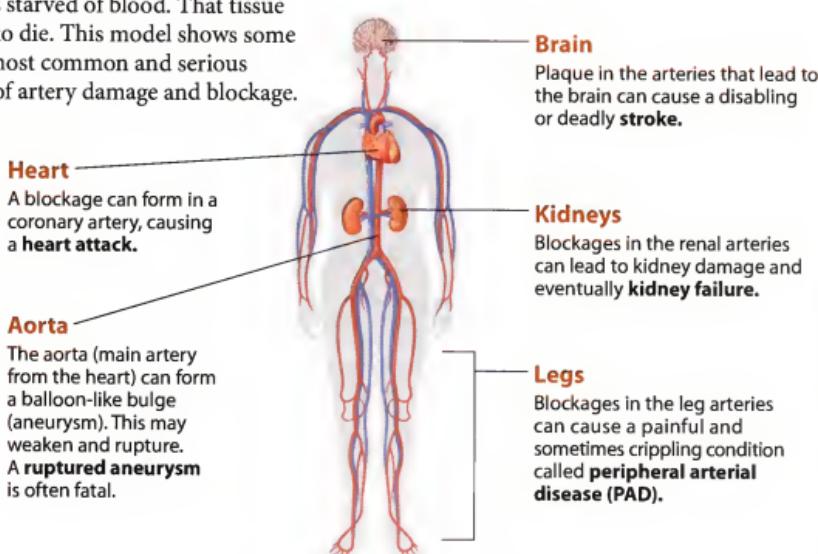
How Plaque Causes Trouble

- Plaque buildup narrows the space inside the artery, so the artery can't carry as much blood.
- Plaque makes arteries stiff. Stiff arteries can't expand to allow increased blood flow when it's needed (for example, during exercise).
- Plaque can rupture, causing blood clots to form on the surface of the plaque. This can cut off blood flow.
- Plaque rupture may also produce emboli (blood clots and fragments of plaque). These may then travel to and block smaller arteries.



Effects of Artery Damage

When blood flow is blocked, some tissue is starved of blood. That tissue begins to die. This model shows some of the most common and serious effects of artery damage and blockage.



How High Is Your Risk?

Now you know what can happen inside your body. But why does one person develop cardiovascular disease while another person doesn't? Risk factors can make the difference. You have at least one risk factor, unhealthy lipids. And you may have others. Check each box below that applies to you. The more boxes you check, the higher your risk of a heart attack, stroke, or other artery problems. Some risk factors, like age and background, you can't change. But don't give up: That just means you need to pay more attention to the risk factors you can change.

 Your Background	 Your Lifestyle	 Your Health History
<ul style="list-style-type: none"><input type="checkbox"/> You're a man 45 or older, or a woman 55 or older.<input type="checkbox"/> Your father or brother had a heart attack or stroke before age 55, or your mother or sister had one before age 65.	<ul style="list-style-type: none"><input type="checkbox"/> You smoke.<input type="checkbox"/> You eat oversized portions.<input type="checkbox"/> You eat a lot of fried, greasy, or salty food.<input type="checkbox"/> You don't exercise much at work or at home.	<ul style="list-style-type: none"><input type="checkbox"/> You're overweight or obese.<input type="checkbox"/> The excess weight is carried mainly around the waist.<input type="checkbox"/> You have pre-diabetes (impaired glucose tolerance) or diabetes.<input type="checkbox"/> You have high blood pressure.

Understanding the Metabolic Syndrome

Risk factors can occur in a cluster called **metabolic syndrome**. This syndrome is, in itself, a risk factor for type 2 diabetes. People with metabolic syndrome also have an especially high risk of heart disease and stroke. You have metabolic syndrome if you have any three of these traits:

- Abdominal obesity (excess fat around the waist)
- High fasting triglycerides
- Low HDL cholesterol
- High blood pressure
- High fasting blood sugar

What You Can Do

Medication and lifestyle changes can help you achieve healthier blood lipid levels. They can also help reduce the impact of other risk factors. **These changes reduce the risk of a heart attack or stroke.** Get to know your lipid levels, risk factors, and goals. With this knowledge, you can make a plan to improve your health.

Understand Your Lab Report

Lipid levels are measured with a blood test. You'll need to fast for 12 hours before the blood is drawn. If possible, use the same lab each time you're tested. The sample below gives tips on reading a lab report. Your healthcare provider will help you understand your results and decide what to do about them.

A **blood lipid panel** lists amounts for LDL, HDL, triglycerides, and total cholesterol. **Ratios** compare two numbers, such as total cholesterol and HDL.

Abnormal numbers may be listed in a separate column to make them easier to spot.

The **reference interval** is an average range. It is not necessarily a healthy range, and it is not the same as your goal.

TESTS	RESULTS	FLAG	UNITS	REFERENCE INTERVAL
CHOLESTEROL	192		mg/dL	100-199
TRIGLYCERIDES	156		mg/dL	0-149
HDL CHOLESTEROL	42		mg/dL	40-59
LDL CHOLESTEROL	119		mg/dL	0-129
CHOL/HDL RATIO	4.6		Ratio	3.9-5.7

The higher,
the better

The lower,
the better

Know Your Numbers

My Current Levels	Recommended Levels	My goals
LDL	<input type="text"/>	LDL
HDL	<input type="text"/>	HDL
Triglycerides	<input type="text"/>	Triglycerides
Total Cholesterol	<input type="text"/>	Total Cholesterol
	LDL <input type="checkbox"/> If you have cardiovascular disease or diabetes: <100 (<70 if advised by your doctor) <input type="checkbox"/> If you have 2 or more risk factors, other than above: <130 (<100 if advised by your doctor) <input type="checkbox"/> If you have 0 or 1 risk factors: <160 HDL >40 for men, >50 for women Triglycerides <150 Total Cholesterol <200	
	Note: > means "greater than" < means "less than"	

Make a Plan

To improve lipid levels, most people need both medication and lifestyle changes. Your exact plan depends on your risk factors and test results. It may include:

- **Taking medication.** Medications can help improve your lipid levels. (See pages 10 to 11.) Other medications can help control blood sugar and blood pressure.
- **Stopping smoking.** Being smoke-free can improve your lipid levels and blood pressure. Your risk of blood clots is lowered, too. Good reasons to quit are endless. Smoking also causes certain cancers and damages your lungs, eyes, and skin. It places the health of your family members at risk as well.
- **Making changes to your diet.** Certain changes in eating patterns can help you lower LDL and triglyceride levels, control blood pressure, and control blood sugar. See pages 12 to 14 for tips on healthy eating.
- **Exercising.** Daily exercise can raise HDL levels and help control blood pressure and blood sugar. See page 15 for exercise tips.
- **Controlling weight.** Being at a healthy weight can help raise HDL levels, lower triglycerides, control blood sugar, and lower blood pressure.

Look at the Big Picture

Controlling your risk factors can seem overwhelming. But look at it this way: Each change you make can affect more than one risk factor. For example, exercise can help raise your HDL levels, and it also helps you lose weight, control blood sugar, and lower blood pressure. Each of these results **lowers your risk of heart attack or stroke**. As a bonus, the steps you take to control your lipids can help you feel better, with more energy for things you enjoy. And you'll be setting a great example for your kids or grandkids. So commit to an overall healthier way of living.



Losing weight can help control lipids, blood pressure, and blood sugar.

How to Quit Smoking: Get Support

Encouragement and support can help you quit. Look for help from:

- **Your healthcare provider.** Ask for help in making a plan to quit smoking. Medication or nicotine replacement products may be an option. Your healthcare provider may recommend a local smoking cessation program.
- **Friends and family.** Explain why you're quitting, and ask for their help in avoiding temptations to smoke. If they smoke, ask them not to smoke when they're with you. Or better still, suggest quitting together.
- **A structured quitting program.** Learn more at www.smokefree.gov.

Medications to Control Lipids

Medications can help improve your lipid levels. (But taking medication is not a substitute for exercise or watching your diet!) In general these medications work by lowering lipid production, or helping to clear lipids from the blood. They are effective and carry a low risk of side effects.

Types of Medications

Several classes of medications are used to control lipids. These medications are highly effective. Side effects are often temporary and are serious only in rare cases. The benefits of these medications far outweigh any risks. In some cases, two or more medications are combined to increase the benefit.

Medication Class	How It Works	Possible Side Effects
Statins	Statins keep the liver from making cholesterol. This causes the liver to take up LDL to get cholesterol, reducing LDL in the bloodstream.	Upset stomach, gas, constipation, and abdominal pain or cramps; abnormal liver function; muscle soreness, pain, and weakness
Bile acid sequestrants	During digestion, bile enters the intestine. Normally most of it is absorbed and returns to the liver. These medications block bile from being absorbed, so more of it passes out of the body in feces. The liver takes LDL from the bloodstream to make more bile.	Constipation, bloating, nausea, and gas; with some medications in this class, interference with absorption of other medications if taken at the same time
Cholesterol absorption inhibitors	This medication blocks the intestine from absorbing cholesterol. Instead, it passes out of the body in feces, so less is available to the liver. The liver takes up more LDL to compensate.	Stomach pain, or fatigue
Fibrates	Fibrates lower production of triglycerides by the liver and help to clear triglycerides from the blood. Fibrates may also increase HDL.	Bloating, nausea, and gas; abnormal liver function; gallstones; increase in the effect of blood-thinning medications
High-dose niacin (vitamin B ₃) Note: Use high doses of niacin only by prescription. Do not use over-the-counter supplements unless advised by your doctor.	In high doses, vitamin B ₃ reduces production of triglycerides. It raises HDL levels. It also reduces production of VLDL, so there is less to turn into LDL.	Flushing , hot flashes, nausea, indigestion, gas, vomiting, diarrhea, and stomach ulcers; increase in the effect of high blood pressure medications; abnormal liver function, gout, or high blood sugar

Working with Your Doctor

Working with your doctor can help you:

- **Prevent liver or kidney damage.** Don't let stories about organ damage scare you. It's true some anticholesterol medications carry a risk of liver or kidney problems. But these problems are rare, and they can be prevented. Your doctor can order regular blood tests to monitor your liver, muscle, and kidney function. These tests can catch problems before they become harmful.
- **Prevent drug interactions.** Some medications interact (affect how one another work). If you're taking medications for other conditions, your doctor needs to know what they are to avoid interactions.
- **Prevent bothersome side effects.** If your medications cause unpleasant or worrisome side effects, ask your doctor what can be done. Another medication or a dosage change may solve the problem. Any changes must be made with your doctor's approval.



Each person is unique. It may take your doctor a few tries to find the best medications and dosage for you.

Tips for Taking Medications

To take medications safely and effectively:

- **Know when and how to take them.** Some medications may need to be taken with food, others on an empty stomach or at a certain time of day.
- **Set things up to help you remember.** For example, work your medications into your routine for getting up in the morning or going to bed at night.
- **Don't skip doses.** Many medications work well only if you take them regularly.
- **Keep track of what you take.** If you take a few different medications, a list or chart can help you take the right pills at the right time. A pillbox with days of the week or times of day is another good tool for keeping track.



Taking medication daily can become as routine as brushing your teeth.

Healthy Eating: Basics

Healthier eating goes a long way toward improving heart health. Everyone should choose fats with care, eat lots of vegetables, and cut sweets and fatty foods. But the exact changes you make depend on your risk factors. A dietitian can help you make an eating plan to fit your needs and tastes. So if you get the chance to see a dietitian, take it! Meanwhile, chew on these basics.

Basic Principles of Healthier Eating

To improve your lipid balance and help control other risk factors:

- **Choose fats wisely.** There are several kinds of fat. In general, fats found in plant foods are better for your body than other fats. **See below and page 13.**
- **Add fiber.** Certain types of dietary fiber help move cholesterol and triglycerides out of your system without being absorbed. To add fiber to your diet, eat more fruits, vegetables, and whole grains. **See page 13.**
- **Reduce calories.** Do you need to lose weight? Reduce calories by eating smaller portions, cutting down on sweets, and filling up on low-calorie foods such as vegetables. **See page 14.**
- **Limit alcohol.** One drink a day may reduce the risk of a heart attack. But more than that can raise triglycerides and blood pressure, and can be bad for general health.
- **Limit salt.** Too much salt (sodium) can raise blood pressure. Your doctor may tell you to limit your salt intake to 1,500 mg a day.

Understanding Dietary Fats

Some facts about the fats and cholesterol you eat:

- **Saturated fat** is found mainly in animal foods. Sources include meat, poultry skin, sausage, and dairy products such as cheese and butter. Cutting back on this type of fat can help lower LDL levels.
- **Trans fat** is found in pastries, baked goods, some margarines, and packaged or deep-fried foods. Eating this fat can raise LDL and also lower HDL. Avoid trans fat as much as you can.
- **Unsaturated fats** are found in vegetable oils, fish, and plant foods such as nuts and seeds. Eating these fats instead of saturated and trans fat can be good for blood lipid levels. But they have as many calories as other fats.
- **Dietary cholesterol.** Remember, some of the cholesterol in your system comes from your food. To limit it, cut back on animal foods, especially organ meats and egg yolks.



The word "hydrogenated" in the ingredients list signals trans fat.

How to Choose Fats Wisely

Try these tips for cutting saturated and trans fat, and choosing healthier fats.

Slimming Down Your Groceries

First, make a grocery list. Begin your shopping trip by loading up on vegetables and fruits. Buying packaged foods? Check the Nutrition Facts label and ingredients to find foods low in saturated fat and trans fat. At the dairy case, choose reduced-fat dairy products. If you use margarine, try a brand with no trans fat. At the meat counter, look for fish, skinless poultry, and lean cuts of meat.

Cooking with Less Fat

Trim visible fat from meat. To adapt your favorite recipes, try to bake, steam, broil, or microwave instead of frying. If you do need to fry something, use nonstick pans or cooking spray. Chill soups and stews after they're cooked, then skim off fat and reheat to serve. For more tips and new recipes, look online or in a heart-healthy cookbook.

How to Add Fiber

Adding fiber is one of many good reasons to eat vegetables and fruits. You can also add fiber to your diet by eating whole grain products or beans instead of white bread, pasta, and other refined starches. Oats are a great source of fiber, so start the day with oatmeal or another oat-based cereal. Try a fiber supplement with psyllium (a high-fiber seed).



Tips for Reading Food Labels

Package labels can be confusing. Keep these tips in mind as you shop:

- **Check the serving size.** All values on the Nutrition Facts label are based on this amount. The serving size is often smaller than you might expect.
- **Look for the words “free,” “zero,” and “no.”** By law “fat-free,” “zero fat,” or “no fat” means that the food contains only a trace (very small) amount of fat per serving. The same is true of claims for trans fat and saturated fat.
- **Beware of the claims “natural” and “low carbohydrate.”** The meanings of these terms are not defined by law. Foods with these claims aren’t necessarily good for you.
- **For more tips, check online at www.fda.gov/Food/LabelingNutrition**

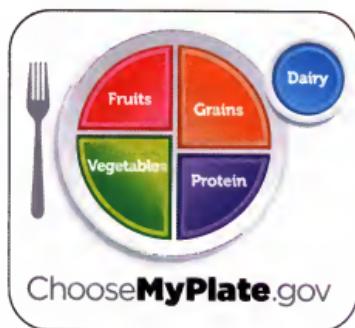
Healthy Eating: Portion Control

There's no way around it: The key to taking off weight is eating less. Whether you're at home, at a restaurant, or at a friend's house, there's probably more on your plate than you really need. Learning to balance your meals can help you include more of what's best for your body and less of what's not.

How Much Should I have Each Day?

Portion control means knowing how much of each type of food to eat each day. Here are some guidelines:

- **Vegetables:** 2 to 3 cups of cooked or raw each day; 1 cup is about the size of your fist.
- **Fruit:** 1½ to 2 cups each day; 1 cup equals 1 small apple, 1 large banana, or 1 cup fresh, frozen, or canned fruit.
- **Grains:** 5 to 7 ounces each day; 1 ounce equals 1 slice bread, 1 cup dry cereal, or ½ cup cooked rice, pasta, or oatmeal.
- **Protein:** 5 to 6 ounces each day; 1 ounce equals 1 egg, ¼ cup cooked dry beans, or 1 ounce meat, fish, or poultry.
- **Dairy:** 3 cups each day; 1 cup equals 1 cup low-fat or fat-free milk or yogurt, 1½ ounces natural cheese, or 2 ounces processed cheese.
- **Oils:** 5 to 6 teaspoons each day; 1 teaspoon is about the size of a thumb tip; choose vegetable oils.



Fill half your plate with vegetables and fruit. Split the other half between whole grains and protein. Choose low-fat or fat-free milk and dairy products.

How Much Should I Eat?

The website at www.choosemyplate.gov can help. Click on "Get a personalized plan." Once there, type in your age, sex, weight, height, and physical activity level. MyPlate will calculate how much of each type of food you should have. To help control portions, follow the guidelines on the left.

Ways to Avoid Eating Too Much

- Serve yourself small portions on small plates.
- To avoid the temptation to take seconds, don't put serving dishes on the table during a meal.
- Don't eat while watching TV.
- Don't eat food from other people's plates.
- Identify situations when you tend to binge, and find ways to change the pattern.
- At parties, don't stand or sit next to the food.

Exercise and Activity

Daily activity is a key factor in cutting your risk of heart attack or stroke. It can also improve your overall health, strength, and energy level. Activity means exercise that gets your heart going. It also means finding ways to pep up your daily routine. Talk to your healthcare provider before you start an exercise program.

Brisk Walking

Walking is great exercise. You don't need any special equipment, just a good pair of shoes. You can walk on the sidewalk, in the park, or at the mall. Start small, and work up to 30 minutes or more a day.

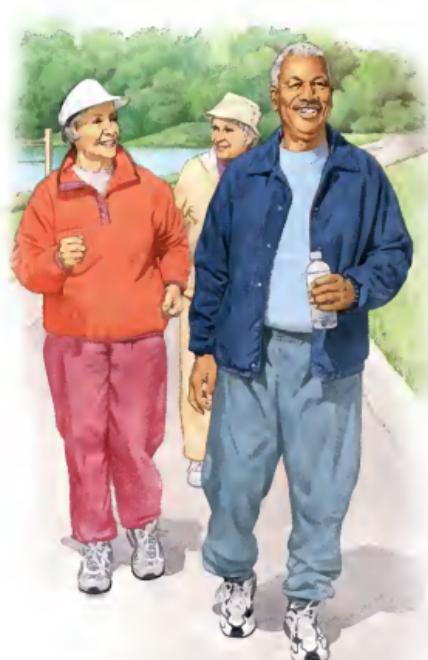
- **Warm up.** Get your heart and muscles ready to go by strolling gently for the first few minutes.
- **Stride briskly.** Move your arms as well as your legs. You should be a little out of breath, but if you can't talk, slow down.
- **Cool down.** Finish by walking at your warm-up pace for about 5 minutes. Stretch gently when you're done.

Being More Active

Activity is not just exercise that makes you sweat. It's also things like gardening, or playing with your kids or grandkids. Get in the habit of being more active throughout the day. For example, when doing errands, walk an extra few blocks instead of driving and re-parking at each stop. And cut down on TV-watching. Chances are you'll find something active to do instead.

Sticking With It

It's easy to decide to make changes. It's also easy to slack off. So make exercise fun. Choose activities you enjoy. You can work out with a friend for company and support. Or you can make exercise a chance to set aside time for yourself. If you're new to exercise, expect some soreness at first. That will pass. You may be surprised at how quickly you start to feel stronger and more fit!



Setting Goals

Work with your healthcare provider to set goals for blood lipids and for your other risk factors. Your goals should be challenging, but also realistic: goals you can meet and maintain over time. Every goal you meet is a step toward better health. Use this chart to keep track of your progress.

Date	LDL	HDL	Triglycerides	Total Cholesterol	Weight	Other

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